Two new *Atheta* species (Coleoptera: Staphylinidae: Aleocharinae) from eastern Canada: taxonomy, bionomics, and distribution

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Abstract—Two new athetine beetles from eastern Canada are described and illustrated: *Atheta* (*Metadimetrota*) *savardae* Klimaszewski and Majka, **sp. nov.** (Nova Scotia, Quebec) and *Atheta* (*Datomicra*) *acadiensis* Klimaszewski and Majka, **sp. nov.** (Nova Scotia, New Brunswick, Prince Edward Island, and Quebec). Their relationships to other closely related species are discussed, and new data on bionomics and distribution are provided. The new species are presented with a short diagnosis, description, colour habitus images, and black-and-white genital images.

Résumé—Deux nouvelles espèces de coléoptères athetines sont décrites et illustrées pour l'Est du Canada : *Atheta* (*Metadimetrota*) *savardae* Klimaszewski et Majka, **sp. nov.** (Nouvelle-Écosse, Québec) et *Atheta* (*Datomicra*) *acadiensis* Klimaszewski et Majka, **sp. nov.** (Nouvelle-Écosse, Nouveau-Brunswick, Île-du-Prince-Édouard et Québec). Les relations avec les espèces proches apparentées sont discutées, et de nouvelles données sur leur bionomie et leur distribution sont apportées. Les nouvelles espèces sont présentées avec une courte diagnose, une description, des images en couleur de leur habitus et des images en noir et blanc de leur structure génitale.

Introduction

This study describes two new athetine beetles (Coleoptera: Staphylinidae) recently discovered from Nova Scotia, New Brunswick, Prince Edward Island, and Quebec. They belong to two subgenera of *Atheta* Thomson: *Metadimetrota* Klimaszewski (in Klimaszewski and Winchester 2002) and *Datomicra* Mulsant and Rey (Mulsant and Rey 1874), *nec* Casey (Casey 1910, 1911). The subgenus *Metadimetrota* was recently erected to accommodate *Atheta* (*Metadimetrota*) *cheersae* Klimaszewski, discovered in coastal British Columbia (Klimaszewski and Winchester 2002). The most distinctive features of this subgenus are the extremely long, stout macrosetae of male sternite eight (Fig. 11). The new species of this subgenus described herein was found in Nova Scotia and Quebec.

The other new species described herein, *Atheta* (*D.*) *acadiensis* **sp. nov.**, was discovered in surveys of beach-drift environments in Nova Scotia, New Brunswick, and Prince Edward Island. It is most similar to the Palearctic species *Atheta* (*D.*) *nigra* (Kraatz).

The concept of the genus *Atheta* (Thomson 1858) varies depending on the authors (Gusarov 2003). In a narrow sense it is restricted to a limited number of species of the subgenus *Atheta* s. str. (see Seevers 1978). In a broad sense it consists of many subgenera in addition to *Atheta* s. str. (Strand and Vik 1964; Benick and Lohse 1974; Klimaszewski and Winchester 2002). We have adopted a broad concept of the genus *Atheta* as defined by Benick and Lohse (1974) and Klimaszewski and Winchester (2002), with a number of subgenera. It is not practical at the present time to treat *Atheta* in a narrow sense because of the poorly defined subgenera, which would have to be elevated to generic rank without satisfactory definitions. The proper ranking and placement of these groups will be possible only after they have been

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revised and properly defined. For the present, the most practical approach is to classify species of *Atheta* in recognized subgenera, when applicable, or in *Atheta* s.l., without a subgeneric classification, when the subgeneric associations are unclear. The alternative would be to abandon working on the genus *Atheta* and wait until all such groups are revised; this approach would be unproductive and would impede investigation of this large and important group of staphylinid beetles. Descriptions of new species in *Atheta* are possible and desirable and will assist future investigators in bringing additional order to this complicated taxonomic group.

There is confusion in North America regarding the concepts of *Datomicra* and *Microdota* Mulsant and Rey. Seevers (1978), followed by Ashe (2001), stated that the two groups are difficult to distinguish even though the pronotal hypomera are fully exposed in lateral aspect in *Microdota* and only partially exposed in *Datomicra*. This difference is not satisfactory for a clear separation of the two groups. Casey (1910, 1911) described several athetine species and assigned them to the genus *Datomicra*, but his classification needs to be revised because of confusion in the definitions of *Datomicra* and *Microdota*. To establish the identity of our new species and confirm its placement within the subgenus *Datomicra*, we compared our specimens with European species of *Datomicra* and *Microdota*, including *M. amicula* (Stephens), the type species of *Microdota* (Brundin 1948; Strand and Vik 1964; Palm 1970; Benick and Lohse 1974). We found no European species identical to *A. acadiensis*; however, *A. nigra* was most similar in terms of external morphology and features of the genitalia (see discussion under the diagnosis of of *A. acadiensis*). In North America we compared specimens of *A. acadiensis* with specimens of both subgenera recorded from Canada (*A.* (*D.*) *dadopora* Thomson, *A.* (*D.*) *celata* (Erichson), *A.* (*D.*) *particula* (Casey), *A.* (*D.*) *surgens* (Casey), *A.* (*M.*) *pennsylvanica* Bernhauer, *A.* (*M.*) *holmbergi* Bernhauer, and *A.* (*M.*) *platanoffi* Brundin) and species described by Casey (1910, 1911) as *Atheta*, *Datomicra*, and *Sableta* spp. from eastern North America (*D.* (*Hilarina*) *atomica* Casey, *D. diffidens* Casey, *D. inopia* Casey = *A. dadopora* Thomson, *D.* (*Hilarina*) *mina* Casey, *D. schematica* Casey = *A.* (*D.*) *dadopora* Thomson, *D. wrangeli* Casey = *D. celata* (Erichson), *D. vacans* Casey, *A.* (*Hilara*) *libens* Casey = *Philhygra finitima* (Casey), *A.* (*Hilara*) *nugator* Casey, *A.* (*Hilara*) *validiceps* Casey = *Philhygra finitima* (Casey), and *S.* (*Taxicerella*) *remissa* Casey). None of these resembled *A. acadiensis*. We have examined the eastern species of nominal "*Datomicra*" only because *A.* (*D.*) *acadiensis* is restricted to the coastal region of eastern North America. It is beyond the scope of this paper to revise the subgenera *Datomicra* and *Microdota*; however, we do provide observations to aid in the process of identification. *Datomicra* may be distinguished by the following combination of character states: body small (length 0.9–2.0 mm), dark brown to black; integument of head, pronotum, and elytra often strongly granulated; antennal segments moderately transverse and about twice as wide as long; pronotum strongly transverse; macrosetae clearly visible on the body profile; apical lobe of paramere broadly triangular with three small setae and with strong basal sclerotization; and male tergite eight bearing four dents apically. Most of Casey's species placed in *Datomicra* lack this combination of characters and we suspect that some of them will be better placed in the subgenus *Microdota*.

Material and methods

Specimens of *Atheta* (*Metadimetrota*) *savarda*e **sp. nov.** were collected in deciduous forests in Nova Scotia and Quebec using unbaited pitfall traps and Luminoc® light-pitfall traps. Specimens of *Atheta* (*Datomicra*) *acadiensis* were collected from rocky seashores in the Maritime Provinces of Canada. Most specimens were dissected. The genital structures were dehydrated in absolute alcohol and mounted in Canada balsam on celluloid microslides and pinned with the specimens from which they originated. The photographs of the genital structures were taken using an image processing system (Nikon SMZ1500 stereoscopic microscope, Nikon DXM 1200F digital camera, Nikon View 5 COOLPIX NSA, Version 5.1.2, and Adobe Photoshop software). The images of entire beetles were generated using an image processing system consisting of a Wild M420 stereoscopic microscope, RT Slider-Spot camera, computer, and Adobe Photoshop software.

Terminology mainly follows that used by Seevers (1978), Klimaszewski (1984), Klimaszewski and Winchester (2002), and Ashe (2001). The face of the aedeagus with the

foramen mediale is considered ventral and the opposite side is considered the dorsal part.

Collection abbreviations are as follows:

CBU	Cape Breton University, Sydney, Nova Scotia, Canada
CGMC	Christopher G. Majka Collection, Halifax, Nova Scotia, Canada
LFC	Natural Resources Canada, Canadian Forest Service, Laurentian Forestry Centre, Québec, Quebec, Canada
NSMC	Nova Scotia Museum Collection, Halifax, Nova Scotia, Canada
NSNR	Nova Scotia Department of Natural Resources Insectary, Shubenacadie, Nova Scotia, Canada
VAC	Private collection of V. Assing, Hannover, Germany

Tribe Athetini Casey

Genus *Atheta* Thomson

Atheta (*Metadimetrota*) *savardae* Klimaszewski and Majka, sp. nov.

(Figs. 1–6, 11–14, 24)

Type material

Holotype: male. **CANADA. Nova Scotia:** Kejimkujik National Park, 21.x–19.xi.1994, B. Wright, pitfall trap, 0113, MAB Plot 1, hardwood stand (NSMC). **Paratypes. CANADA. Nova Scotia:** Kejimkujik National Park, 21.x–19.xi.1994, B. Wright, pitfall trap, 0101, MAB Plot 1, hardwood stand (NSMC) 5 males, 2 females, 1 sex?, (LFC) 1 male; same data except 0105 (NSMC) 2 males, 5 females, (LFC) 1 male; 0113 (NSMC) 5 males, 1 sex?; 0121 (NSMC) 2 males, 2 sex?; 0125 (NSMC) 2 males, 2 females, (LFC) 1 male; 26.x–19.xi.1994, 0213 (NSMC) 6 males, 1 female, (LFC) 1 female; 26.x–19.xi.1994, 0221 (LFC) 1 male, 1 female; 7–21.x.1994, pitfall trap, 0125, MAB Plot 1 (NSMC) 2 males; Cape Breton Co., Georges River, 9.xi.1993, D.B. McCorquodale (CBU) 1 female, (LFC) 1 male; Cape Breton Co., Sydney, UCCB, 46°09′N 60°07′W, 5.xi.2003, mixed woods, D.B. McCorquodale (CBU) 8 males, 2 females, (LFC) 1 male. **Quebec:** Erablière Qué. [Saint-Jacques-de-Leeds, 46°16′N 71°23′W], 1.x.1993, Fosse P-3 (LFC) 1 male; Erablière Qué., 1.x.1993, Fosse L-2 (LFC) 1 male; Erablière Qué., 21.ix.1993, Fosse L-1 (LFC) 1 male, 1 female.

Figs. 1–2. *Atheta* (*Metadimetrota*) *savardae*: 1, lateral view; 2, dorsal view.

Etymology

Named for Ms. Karine Savard, biology student, who dissected the specimens from this and many other projects on Canadian aleocharine beetles.

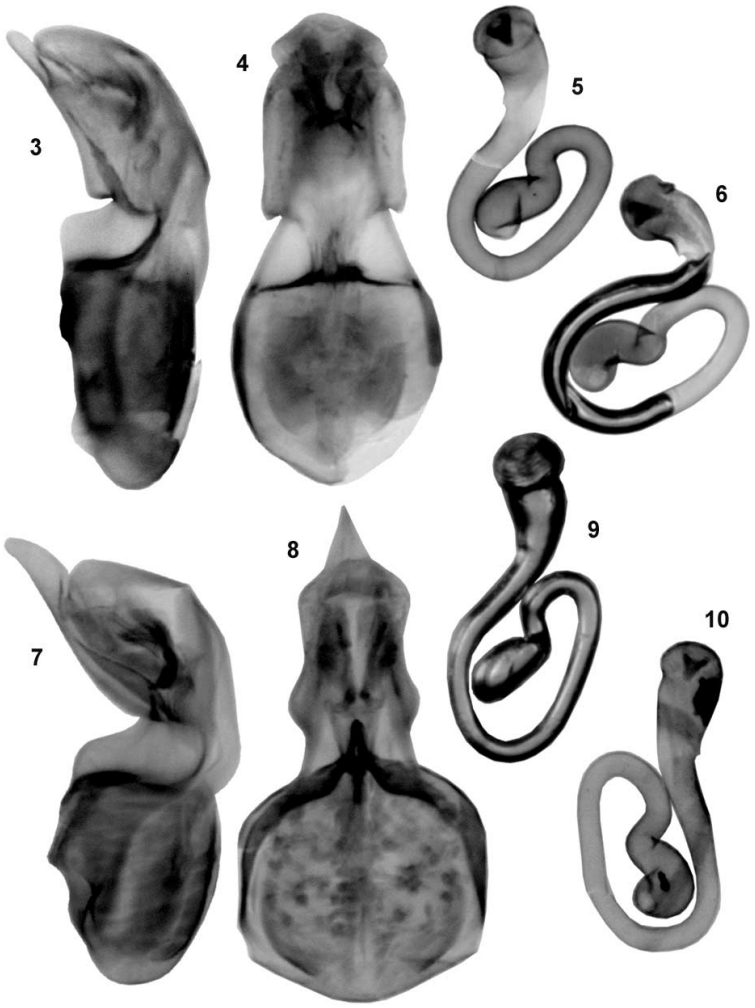
Diagnosis

This species is similar to *Atheta* (*M.*) *cheersae* Klimaszewski from British Columbia (Figs. 7–10; Klimaszewski and Winchester 2002: Figs. 20*a*, 20*b*, 113–118) but may be easily distinguished by the narrower body (Fig. 2), dark brown pronotum, abdomen, and apical antennal segments, narrower and shorter apical part of the median lobe of the aedeagus with angular lateral projections (Figs. 3, 4) (*A.* (*M.*) *cheersae*: Figs. 7–10), and slightly more horizontally oriented loop of the spermathecal stem (Figs. 5, 6). From all other athetine species it differs by the extremely long and stout macrosetae of male sternite eight (Fig. 12).

Description

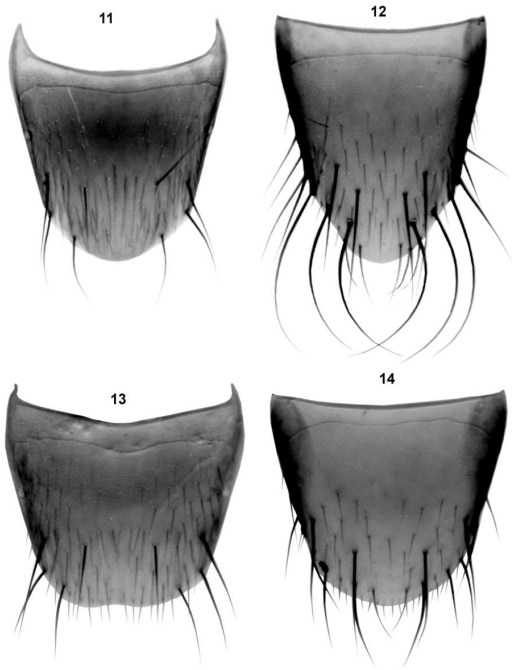
Body flattened, length 3.0–3.5 mm, moderately glossy, more so on posterior abdomen; head, apical antennal segments, pronotum, and

Figs. 3–10. Genital structures. 3–6, *Atheta* (*Metadimetrota*) *savardae*: 3, median lobe of aedeagus in lateral view; 4, median lobe of aedeagus in dorsal view; 5, 6, spermatheca in lateral view. 7–9, *Atheta* (*Metadimetrota*) *cheersae*: 7, median lobe of aedeagus in lateral view; 8, median lobe of aedeagus in dorsal view; 9, 10, spermatheca in lateral view.



most of abdomen (except for apex) dark brown; margins of pronotum sometimes paler or rarely entire pronotum light brown (Figs. 1, 2); forebody sparsely punctated and pubescent, punctation slightly asperate, microsculpture distinct and consisting of convex isodiametric sculpticells. Head transverse, angular, slightly narrower than pronotum (Fig. 2); postocular carina present but diffused near eye. Pronotum transverse, about one fourth broader than long, broadest in apical third, only slightly broader than head and about one fifth narrower than elytra; pubescence directed laterad from midline of disc (Fig. 2). Elytra transverse, one third broader than length of suture (Fig. 2). Abdomen narrowly elongate and tapering apically, bearing strong and long apical ventral and lateral macrosetae in males (Fig. 2). **Male:** tergite eight broadly arcuate apically, antecostal line slightly sinuate (Fig. 11). Sternite eight produced apically and bearing extremely long macrosetae, antecostal suture arcuate (Fig. 12). Median lobe of aedeagus with narrow apex and angular lateral projections (Figs. 3, 4). **Female:** tergite eight truncate apically; antecostal suture sinuate medially (Fig. 13). Sternite eight rounded apically, antecostal suture sinuate medially and laterally (Fig. 14). Spermatheca with capsule elongate and spherical apically, bearing deep apical invagination, stem broadly looped and

Figs. 11–14. *Atheta* (*Metadimetrota*) *savardae*: 11, male tergite eight; 12, male sternite eight; 13, female tergite eight; 14, female sternite eight.



twisted posteriorly; apical portion of stem enlarged (Figs. 5, 6).

Bionomics

Adults have been collected between August and October. In Kejimkujik National Park, Nova Scotia, specimens were collected in a mature deciduous forest composed of beech (*Fagus grandifolia* Ehrh.), red oak (*Quercus rubra* L.), maple (*Acer* spp.), and birch (*Betula* spp.). On Cape Breton Island, Nova Scotia, specimens from Sydney (UCCB forest) were found in an early successional conifer-dominated forest (*Picea glauca* (Moench) Voss, *Abies balsamea* (L.) Mill., and *Betula papyrifera* Marsh.), while those from Georges River were in an old field adjacent to a mixed forest. In Quebec, specimens were collected in a maple forest. Specimens were captured using unbaited pitfall traps and Luminoc® light-pitfall traps. Thus, early indications are that this species is tolerant of a wide variety of forest and forest-edge habitats in deciduous and coniferous forests.

Distribution

This species is known from Nova Scotia and southern Quebec (Fig. 24).

Fig. 15. *Atheta* (*Datomicra*) *acadiensis* in dorsal view (terminal segments removed).

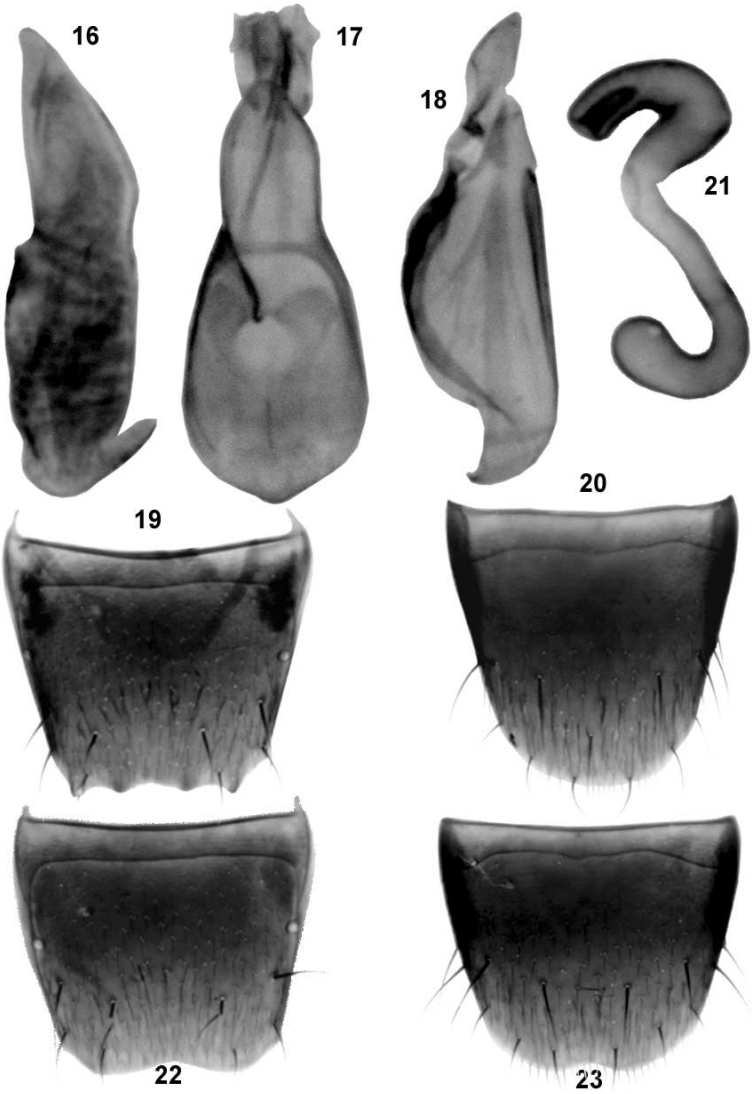
Atheta (*Datomicra*) *acadiensis* Klimaszewski and Majka, sp. nov.

(Figs. 15–24)

Type material

Holotype: female. **CANADA. Nova Scotia:** Digby Co., Pond Cove, Brier Island, 26.vii.2003, rocky shore, yellow pan trap, J. Ogden, K. Goodwin (NSNR). **Paratypes. CANADA. Nova Scotia:** Digby Co., Pond Cove, Brier Island, 22.vi.2003, rocky shore, yellow pan trap, J. Ogden, K. Goodwin (NSNR) 1 male, 2 females, (LFC) 1 male, 1 female; Digby Co., Pond Cove, Brier Island, 26.vi.2003, rocky shore, yellow pan trap, J. Ogden, K. Goodwin (NSNR) 2 males, 1 female, (LFC) 1 male; Digby Co., Pond Cove, Brier Island, 28.vi.2003, rocky shore, pitfall trap, J. Ogden, K. Goodwin (NSNR) 6 males, 3 females, (LFC) 1 male; Digby Co., Big Meadow, Brier Island, 24.vii.2003, raised bog pitfall trap, J. Ogden, K. Goodwin (NSNR) 2 females, (LFC) 1 female; Digby Co., Gull Rock Road, Brier Island, 24.vii.2003, forested pitfall

Figs. 16–23. Genital structures of *Atheta* (*Datomicra*) *acadiensis*: 16, median lobe of aedeagus in lateral view; 17, median lobe of aedeagus in dorsal view; 18, paramere; 19, male tergite eight; 20, male sternite eight; 21, spermatheca; 22, female tergite eight; 23, female sternite eight.

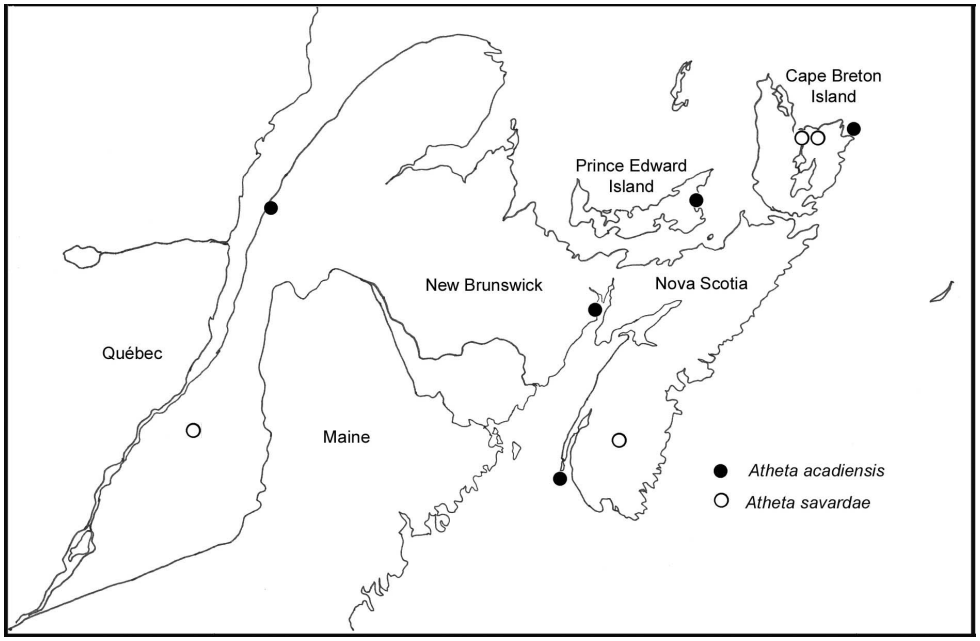


trap, J. Ogden, K. Goodwin (NSNR) 1 male; Cape Breton Co., Scatarie Island, Northwest Cove, 8.viii.2005, under wrack on beach, S.M. Townsend and A. MacDonald (CBU) 3 specimens. **New Brunswick:** Mary's Pt., Albert, 23.viii.2003, under seaweed: seashore, C. Majka (CGMC) 5 males, 7 females, (LFC) 3 males. **Prince Edward Island:** Launching, Kings, 26.viii.2003, under seaweed: seashore, C. Majka (CGMC) 1 male, 2 females. **Quebec:** 250 km NE Québec, Parc du Bic, SW Rimouski, 48°21′10″N, 68°48′20″W, 11.viii.2005, V. Assing (VAC) 1 male, 1 female, 1 sex?.

Etymology

The name of the specific epithet derives from the French word Acadie (in English: Acadia), the former French colony established in 1604 that encompasses modern-day Nova Scotia, New Brunswick, and Prince Edward Island, the three jurisdictions where the new species has been found. The new name is proposed in

Fig. 24. Distribution records for *Atheta* (*Metadimetrota*) *savardae* and *Atheta* (*Datomicra*) *acadiensis*.



reference to the known geographical distribution of the species, and also to honour the long history of the Acadian people and their contribution to the culture of the region and country.

Diagnosis

Atheta (*D.*) *acadiensis* is most similar to Palearctic *Atheta* (*D.*) *nigra*, *A.* (*D.*) *celata* (Erichson), and *A.* (*D.*) *zosterae* Thomson, from which it may be distinguished by having antennal segments 6–10 elongate (Fig. 15) (transverse in *A.* (*D.*) *nigra*) and by the semicircular posterior part of the spermatheca (Fig. 21) (fully looped in *A.* (*D.*) *nigra*, Fig. 15:3 in Benick and Lohse 1974). The median lobe of the aedeagus and male tergite eight are similar in both *A.* (*D.*) *acadiensis* and *A.* (*D.*) *nigra*. *Atheta* (*D.*) *acadiensis* is also similar to Palearctic *A.* (*D.*) *transitoria* Benick, from which it differs by having a broader body, longer antennal segments 6–10, and smaller dents on the apical margin of male tergite eight (dents in *A.* (*D.*) *transitoria* are larger and similar to those of *A.* (*D.*) *dadopora*; see Fig. 74 in Klimaszewski *et al.* 2005) and by the semicircular end of the spermathecal stem (for genital illustrations of *A.* (*D.*) *transitoria* see Fig. 15: 4 in Benick and Lohse 1974). It is also superficially similar to Nearctic *A.* (*D.*) *vacans* (Casey), from which it differs by its larger (2.0–2.5 mm), long body, elongate antennal segments 6–10, and differently shaped spermatheca with smaller posterior stem enlargement.

Description

Body moderately convex, length 2.0–2.5 mm, moderately glossy and more so on posterior abdomen, uniformly dark brown to black (Fig. 15); forebody sparsely punctated and pubescent, microsculpture distinct and consisting of flat isodiametric sculpticells. Head slightly transverse, rounded behind eyes, slightly narrower than pronotum (Fig. 15), postocular carina present but diffused near eye. Pronotum transverse, about one fourth broader than long, broadest in apical third, only slightly broader than head and about one fifth narrower than elytra; pubescence on midline of disc directed anteriad, laterad elsewhere (Fig. 15). Elytra transverse, pubescence directed obliquely posteriad (Fig. 15). Abdomen narrowly elongate, slightly arcuate laterally, and tapering apically (Fig. 15). **Male:** tergite eight truncate apically; antecostal suture slightly sinuate; apical margin of disc bearing two large lateral dents and two small ones between them (Fig. 19). Sternite eight round apically; antecostal suture sinuate (Fig. 20). Median lobe of aedeagus with moderately large bulbus, narrow tubus, and inconspicuous internal sac structures

(Figs. 16, 17). **Female:** tergite eight slightly emarginated apically or evenly truncate; antecostal suture straight (Fig. 22). Sternite eight rounded apically; antecostal suture sinuate medially and laterally (Fig. 23). Spermatheca with capsule elongate, bearing long apical tubular extension and deep apical invagination, stem broadly curved posteriorly; apical portion of stem enlarged (Fig. 21).

Bionomics

Almost all the specimens of *A.* (*D.*) *acadiensis* have been found in a narrow, well-defined ecological zone within dry beach-drift material at the top of the littoral zone. In New Brunswick and Prince Edward Island this material consists primarily of dead *Ascophyllum nodosum* (L.) Le Jolis and *Fucus vesiculosus* L. (Phaeophyta: Fucaceae) together with other organic and inorganic matter deposited by the tides on sandy beaches. The ecological zone lies between the dry, sandy areas inhabited by the amphipod *Talorchestia longicornis* (Say) (Crustacea: Amphipoda: Talitridae) higher up the littoral zone and the wetter, seaweed-dominated drift material inhabited by the amphipod *Orchesia gammarella* Pallas (Talitridae) farther below. On Brier Island, Nova Scotia, most specimens were collected in pitfall or pan traps set amongst cobbles and beneath beach-drift in this zone on a rocky beach. A few individuals were collected in a raised bog and a forested area directly inland from the beach, indicating that the species penetrates adjacent habitats to some degree. Adults have been collected in June through August.

Other beach-drift Coleoptera found in association with *A.* (*D.*) *acadiensis* include *Atheta novascotiae* Klimaszewski and Majka, *Aleochara litoralis* (Mäklin), *Leptacinus intermedius* Donisthorpe, and *Cafius bistriatus* Erichson (Staphylinidae); *Cercyon litoralis* (Gyllenhal) (Hydrophilidae); *Hypocaccus dimidiatipennis* (LeConte) and *H. fraternus* (Say) (Histeridae); *Monotoma producta* LeConte (Monotomidae); *Blapstinus metallicus* (Fabr.) (Tenebrionidae); and *Amblyderus pallens* (LeConte) and *Anthicus scabriceps* LeConte (Anthicidae). While the ecology of some of the species found in this microenvironment is still imperfectly known (most appear to be either detritivores or carnivores), this complex of beetles occupies a narrowly defined niche and exploits a particular trophic resource in the manner of a guild niche (Terborgh and Robinson 1986) or trophic guild (Yodzis 1982).

Distribution

This species is presently known from coastal areas of Nova Scotia, New Brunswick, and Prince Edward Island (Fig. 24).

Remarks

In addition to *A.* (*D.*) *acadiensis*, there are two other species of the subgenus *Datomicra* known to occur in Canada. They are *A.* (*D.*) *dadopora* (Gusarov 2003; Klimaszewski *et al.* 2005) and *A.* (*D.*) *celata*, recently reported for the first time from Canada (Majka *et al.* 2006).

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